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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,371	04/12/2004	Steven C. Shannon	8824/ETCH/DRIE	4850

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/823,371	SHANNON ET AL.	
	Examiner	Art Unit	
	Maureen G. Arancibia	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-10 and 12-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-10 and 12-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 August 2006 has been entered.

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 4, 6-10, and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,642,149 to Suemasa et al. in view of Japanese

Patent Application Publication 06-243992 to Deguchi et al. The following rejection refers to the Figures and English Machine Translation of this document.

In regards to Claims 1, 9, and 10, Suemasa et al. teaches an apparatus for matching the impedance of a pair of RF sources coupled to a single electrode to the impedance of a plasma in a semiconductor substrate processing chamber, comprising: a processing chamber 102 comprising a first electrode 106; a first RF source 122; a second RF source 128; and a dual frequency matching circuit, comprising a first sub-circuit 120 for matching the impedance of a first RF signal generated by first RF source 122 to the impedance of the plasma, and a second sub-circuit 126 for matching the impedance of a second RF signal generated by second RF source 128 to the impedance of the plasma. The second sub-circuit is connected to the first sub-circuit to form a common output that is coupled to the first electrode 106. (Figure 1)

Suemasa et al. teaches that each of the first and second sub-circuits 120, 126 comprise a variable shunt component (capacitor). (Figure 1) Suemasa et al. further teaches that each of the first and second sub-circuits comprise a set of series components; one fixed (inductor) and one variable (capacitor). (Figure 1)

Suemasa et al. does not expressly teach that each of the first and second sub-circuits comprise a non-variable set of series components.

Deguchi et al. teaches that a matching circuit 14 should comprise a fixed set of series components. (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify each of the first and second matching sub-circuits taught by Suemasa et al. to each have a fixed set

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of series components, rather than one fixed and one variable. The motivation for making such a modification to each sub-circuit, as taught by Deguchi et al. (English Machine Translation, Paragraphs 11, 30, and 31), would have been to shorten matching time and to improve responsiveness by substituting variance in the RF source frequency for variance in the series component (capacitor).

In regards to Claims 1, 3, 9, 10, and 12, the apparatus taught by the combination of Suemasa et al. and Deguchi et al. meets all of the structural limitations of the claimed invention, and would be inherently structurally capable of performing the intended use of allowing the first match tune space defined by the first sub-circuit to be varied without substantially affecting the second match tune space defined by the second sub-circuit, by varying the variable shunt capacitors. (The Examiner refers to Paragraphs 20 and 21 of the instant Specification, which disclose that this intended use is performed in the manner just described as capable of being performed by the apparatus taught by Suemasa et al.) This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112). Moreover, it has been held that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 4 and 13, the match tune spaces of the first and second RF sources taught by the combination of Suemasa et al. and Deguchi et al. would be inherently structurally capable of being controlled by varying the frequency of the signal generated by one of the first and second RF sources taught by Suemasa et al., which are variable RF sources (Column 5, Lines 60-66; Column 6, Lines 6-16). This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112). Moreover, it has been held that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 6 and 14, the first and second sub-circuits taught by the combination of Suemasa et al. and Deguchi et al. would be inherently structurally capable of being fixed in a predetermined configuration prior to performing a process in the chamber, based on user control of the variable shunt capacitors and variable RF sources. This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112). Moreover, it has been held that a claim containing a "recitation with respect to the manner in which a

claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 7 and 15, the apparatus taught by the combination of Suemasa et al. and Deguchi et al. would be inherently structurally capable of matching the impedance of the first and second RF sources to the impedance of the processing chamber during processing by varying at least one of the variable shunt capacitors of the first and second sub-circuits (Suemasa et al., Figure 1), or by varying the frequency of at least one of the first and second RF sources taught by Suemasa et al., which are variable RF sources (Column 5, Lines 60-66; Column 6, Lines 6-16). This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112). Moreover, it has been held that a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 8 and 16, Suemasa et al. teaches isolation sub-circuits 118, 124 for preventing power supplied from either of the first and second RF sources 122,

128 from being coupled to the other of the first and second RF sources. (Column 4, Lines 1-3 and 11-13)

In regards to Claims 17-19, Suemasa et al. teaches that the first and second RF sources 122, 128 are both configured to provide an RF signal having a frequency that meets the recited range of about 50 KHz to about 14.2 MHz. Specifically, Suemasa et al. teaches that a first frequency can be from 2 MHz to 10 MHz (Column 2, Lines 34-39; also Claim 3, Column 8, Lines 23-25), which falls within the claimed range, and thus meets the recited limitation. Suemasa et al. teaches that a second frequency can be 10 MHz and higher (Column 2, Lines 49-50; also Claim 3, Column 8, Lines 23-25), which overlaps with the claimed range, and thus meets the recited limitation.

However, more importantly, it is noted that the claims in the instant application are apparatus claims, and that tuning the RF signal of each *variable* RF source to a frequency in the claimed range is considered a recitation of intended use of the apparatus. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant case, the RF sources taught by Suemasa et al. are, as established above, *variable* RF sources (Column 5, Lines 60-66; Column 6, Lines 6-16) *capable* of being tuned to frequencies within the claimed range. Thus, there is no *structural* difference to patentably distinguish the claimed invention from the prior art.

In regards to Claim 20, see the discussion of Claim 1.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suemasa et al. in view of Deguchi et al. as applied to Claim 1 above, and further in view of U.S. Patent 6,887,339 to Goodman et al.

The teachings of Suemasa et al. and Deguchi et al. were discussed above.

The combination of Suemasa et al. and Deguchi et al. does not expressly disclose the output impedance of the first and second RF sources.

Goodman et al. teaches that RF sources conventionally have a 50 Ohm output impedance. (Column 1, Lines 57-59)

It would have been obvious to one of ordinary skill in the art to use RF sources with a 50 Ohm output impedance in the apparatus taught by Suemasa et al. and Deguchi et al. The motivation for doing so would have been to assemble the apparatus using standard (readily available) components.

Response to Arguments

6. Applicant's arguments filed 14 August 2006 have been fully considered but, to the extent to which they still apply, they are not persuasive.

Applicant argues that the ranges in frequency taught by Suemasa et al. do not anticipate the ranges recited in the claims. The examiner must disagree. Applicant claims that both the first and second RF signals have a frequency between about 50 KHz and 14.2 MHz. Suemasa et al. teaches that a first RF signal can have a frequency from 2 MHz to 10 MHz (Column 2, Lines 34-39; also Claim 3, Column 8, Lines 23-25), and that a second RF signal can have a frequency of 10 MHz and higher (Column 2, Lines 49-50; also Claim 3, Column 8, Lines 23-25). Contrary to applicant's assertion,

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Suemasa et al. does not teach that the second RF frequency is preferably 100 MHz, but rather that the *maximum* frequency is preferably 100 MHz; i.e. the second RF frequency is preferably *no higher than* 100 MHz. And while Suemasa et al. does teach keeping a difference of, for example, around 24 MHz (3 MHz vs. 27.12 MHz) between the two frequencies to prevent invasion of each high frequency power component into the other power supply mechanism, this is not believed to constitute a teaching away from an apparatus configured to match more closely spaced frequencies. Teaching a *better* way of configuring an apparatus is not the same as teaching away from another way of configuring the apparatus. Overall, it is believed that Suemasa et al., while not giving any express examples of having both frequencies within the claimed ranges, *does* disclose the relatively broad ranges recited in the claims with sufficient specificity and overlap to anticipate the claimed ranges.

However, more importantly, it is noted that the claims in the instant application are apparatus claims, and that tuning the RF signal of each *variable* RF source to a frequency in the claimed range is considered a recitation of intended use of the apparatus. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant case, the RF sources taught by Suemasa et al. are, as established above, *variable* RF sources (Column 5, Lines 60-66; Column 6, Lines 6-16) *capable* of being tuned to frequencies

within the claimed range. Thus, there is no *structural* difference to patentably distinguish the claimed invention from the prior art.

In response to applicant's arguments against the references individually, namely that Deguchi et al. only teaches a single RF power supply and a single matching part, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that Deguchi et al. is not concerned with the interaction of multiple frequencies applied to a single electrode, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Finally, in regards to applicant's argument that both Suemasa et al. and Deguchi et al. are assigned to the same assignee, Tokyo Electron Ltd., and that if it were obvious to combine the teachings of Suemasa et al. and Deguchi et al., Tokyo Electron Ltd. would already have done so, this argument is not persuasive. That Tokyo Electron Ltd. may not have sought to combine the teachings of Suemasa et al. and Deguchi et al., or may not have published a teaching of such a combination, does not obviate a rejection on the grounds that *it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suemasa et al. and Deguchi*

et al. with a reasonable expectation of success and the motivation as discussed in the rejection above.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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